10) a) $i = i_0 \cdot e^{-t/\tau} \Rightarrow \frac{i}{i_0} = e^{-t/\tau} \Rightarrow 0,5 = e^{-t/\tau} \Rightarrow e^{t/\tau} = 2 \Rightarrow \frac{t}{\tau} = \ln 2 \Rightarrow$

$\tau = \frac{t}{\ln 2} = \frac{4}{\ln 2} \Rightarrow \tau = 5,77\ s$

b) $\tau = \frac{L}{R} \Rightarrow L = \tau . R = 5,77 . 5 \Rightarrow L = 28,85\ H$

11) $\omega = \frac{1}{\sqrt{L.C}} \Rightarrow f = \frac{1}{2\pi\sqrt{L.C}} \Rightarrow L = \frac{1}{4\pi^2 f^2 . C} = \frac{1}{4\pi^2 . 60^2 . 80 \times 10^{-6}} \Rightarrow$

$L = 8,8 \times 10^{-2}\ H$

12) $\oint_a \vec{B} . d\vec{\ell} = \mu_0 . i_a = 0$

$\oint_b \vec{B} . d\vec{\ell} = \mu_0 . i_b = \mu_0 . (-i_1) = 4\pi \times 10^{-7} (-4) = -5,03 \times 10^{-6}\ T.m$

$\oint_c \vec{B} . d\vec{\ell} = \mu_0 . i_c = \mu_0 (-i_1 + i_2) = 4\pi \times 10^{-7} . (-4+6) = 2,51 \times 10^{-6}\ T.m$

$\oint_d \vec{B} . d\vec{\ell} = \mu_0 . i_d = \mu_0 (-i_1 + i_2 + i_3) = 4\pi \times 10^{-7} (-4+6+2) = 5,03 \times 10^{-6}\ T.m$